

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. Claims 26, 31, 39, 42, 45, 56, and 61-69 have been amended. No new matter has been added. Accordingly, Claims 26-69 will be pending in the present application upon entry of this Amendment and Reply.

Applicants note that Claim 61 has been amended to be written as a method claim as opposed to a product-by-process claim, so the method recitations included therein should be considered as being relevant to the patentability of the claim and its associated dependent claims.

Claim Objections

On page 3 of the final Office Action, Claims 31 and 42 were objected to by the Examiner. Appropriate correction has been made. Reconsideration and withdrawal of the claim objections is respectfully requested.

Claim Rejections – 35 U.S.C. §§ 102/103

The claims of the present application were rejected under 35 U.S.C. § 102 or § 103 in the final Office Action. Specifically:

- Claims 26, 27, 36, 45, 48, 54, and 61-66 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Takuya et al. (JP 07-220734) in evidence of Sauer (US 4,336,217);
- Claims 28, 32, 34, 38, 46-47, and 49 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Sauer;
- Claims 29, 39, 50, and 56 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Kato (US 6,054,230);
- Claims 30, 31, and 51 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Takeuchi et al. (US 5,571,640);
- Claims 33 and 52 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Sauer and further in view of Plowman et al. (US 4,581,116);

- Claims 35 and 53 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Santilli et al. (US 5,651,813);
- Claims 37 and 55 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Gascoyne et al. (US 2002/0015879);
- Claims 40, 41, 43, 57, 59, and 67-69 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Binder (US 3,854,994) and Solomon (US 4,440,617); and
- Claim 44 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Takuya et al. in view of Plowman.

Applicants respectfully traverse the above rejections, since none of the references, whether taken alone or in combination with each other, disclose, teach, or suggest the combinations of elements recited in the independent claims of the present application.

Although Applicant respectfully disagrees with the characterization of the Sauer and Takuya references presented in the Advisory Action, independent Claims 26, 45, and 61 have nevertheless each been amended herein in an attempt by Applicant to advance prosecution on the merits.

Independent Claim 26 recites, among other elements, “forming an active layer by agglomerating a first powder mixture with PTFE particles in a dry form to produce a first dry agglomerate, adding a first organic solvent to the first dry agglomerate to produce a first paste, and calendering the first paste to form the active layer, wherein the first powder mixture prior to said agglomerating comprises carbon and a catalyst” and “forming a gas diffusion layer by agglomerating a second powder mixture with PTFE particles in a dry form to produce a second dry agglomerate, adding a second organic solvent to the second dry agglomerate to produce a second paste, and calendering the second paste to form the gas diffusion layer.”

Independent Claim 45 recites, among other elements, “forming an active layer and a separate gas diffusion layer using separate processes that each comprise agglomerating a powder mixture with PTFE particles in a dry form to produce a dry agglomerate, adding an organic solvent to the dry agglomerate to produce a paste, and calendering the paste, wherein the powder

mixture for the active layer comprises a catalyst prior to agglomerating such powder mixture with PTFE particles.”

Independent Claim 61 recites, among other elements, a “gas diffusion layer” and an “active layer” that are “each formed from a paste created from a mixture of a powder mixture and PTFE particles” and are “manufactured in separate processes that each comprise agglomerating a powder mixture with PTFE particles in a dry form to produce a dry agglomerate, adding an organic solvent to the dry agglomerate to produce a paste, and calendering the paste, wherein the powder mixture for the active layer comprises a catalyst prior to agglomerating such powder mixture with PTFE particles.”

None of the cited references, whether taken alone or in combination, appear to disclose, teach, or suggest forming an agglomerate from a powder mixture that includes a catalyst and then adding a solvent to produce a paste before calendering.

For example, Sauer discloses at column 2 beginning at line 15 as follows, and does not disclose, teach, or suggest that agglomerates are formed from a powder mixture that includes a catalyst (underlining added for emphasis):

Referring to FIG. 1, the paddle mixer 1 shown therein is supplied through inlet port 2 with active carbon and PTFE powder in a weight relationship in accordance with the invention of 5:1, to 1:1 preferably 3:1 to 2:1. The ingredients may be provided separately or may be coarsely premixed. After activation of the mixer paddles 3 which rotate in two planes with a rate of rotation of about 80 rpm, driven by motor 4, there further intervene in the mixing process the rapidly rotating sharp knives 6 of a cutting head 5 driven by motor 7. In accordance with the invention, the peripheral velocity of knives 6 should be at least 15 m/sec, and preferably about 25 m/sec or higher. These values are obtained, for example, with knives having 150 mm diameter, i.e. length, when the rate of rotation of motor 7 equals about 3000 rpm. At this high speed, the cutting edges impinge upon the mixture particles with such intensity that especially the PTFE agglomerates which are still present are fractured into very fine particles. In so doing, there even takes place a partial vaporization of PTFE, which then precipitates

elsewhere upon the carbon particles. After about 8 to 10 hours of treatment in accordance with the invention, there can be removed from outlet port 8 a completely homogeneous mixture with an extraordinarily high degree of subdivision. Even at 18-fold magnification, no PTFE particles remain observable.

In contrast, independent Claims 26, 45, and 61 each recite that the powder mixture used to form the active layer includes a catalyst prior to agglomeration. This would result in both carbon particles and catalyst having a PTFE coating, which is not disclosed, taught, or suggested by any of the cited references. Accordingly, Applicants respectfully request reconsideration and allowance of all pending claims.

Applicant also respectfully disagrees with several of the statements presented in the advisory Action.

For example, the Examiner stated that “Takuya discloses ‘mixing’ which appears to be the same as one of the methods disclosed in the instant specification as resulting in an agglomerate” and that “Takuya teaches producing a dry agglomerate because the methods used are the same.” Applicant reiterates that not all “mixing” is the same – a slow mixing would result in a very different end process than a mixing process that would be used to form an agglomerate. Those of ordinary skill in the art would readily appreciate that a certain type of mixing would be required to produce agglomerates as described in the present application. There is no support whatsoever for the assertion that Takuya disclosed, teaches, or even suggests forming an agglomerate merely because it discloses some form of “mixing.”

Applicants further disagree with the Examiner’s assertion in the final Office Action that Takuya discloses “forming an active layer by agglomerating a first powder mixture with PTFE particles in a dry form to produce a first dry agglomerate” or “agglomerating a second powder mixture with PTFE particles in a dry form to produce a second dry agglomerate,” as stated on page 4 of the Office Action. For this proposition, the Examiner relied upon the Abstract and paragraph [0017] of the English translation of Takuya, which are reproduced here (grammatical errors in original translation provided by Examiner):

Abstract: Water repellent carbon black is mixed with polytetrafluoroethylene and a carbon of graphite system, to add solvent naphtha and surface active agent rolled by a roll method, and a 6 mm thick reserved molded gas diffusion layer sheet is obtained. Hydrophilic carbon black, water repellent carbon black and polytetrafluoroethylene are mixed further rolled by a roll method by adding solvent naphtha, and a 0.3 mm thick preliminary molded reaction layer sheet is prepared...

[0017] Mean diameter: To 420A water-repellent carbon black (DIN a turnip rack), by mean diameter: 0.3 micrometer polytetrafluoroethylene and a graphite system, the carbon fiber (average Itonaga: 0.13 mm and a diameter: of fiber 13 micrometer) was mixed at a rate of the weight ratio 50:40:20, solvent naphtha was mixed by the ratio of 1:1.6 to it, rolling shaping of what added the surfactant further was carried out by the rolling method, and the performing gaseous diffusion layer sheet of 6 mm thickness was obtained. Moreover, mean-diameter: 400A hydrophilic carbon black (Valcan XC72R), mean-diameter: 420A water-repellent carbon black (DIN a turnip rack), and a mean diameter: 0.3-micrometer polytetrafluoroethylene was mixed at a rate of the weight ratio 50:20:30, solvent naphtha was mixed at a rate of 1:1.8 to it, it rolled out by the rolling method, and the performing reaction layer sheet of 0.3 mm thickness was obtained...

It is specifically noted that neither of these paragraphs give any indication that the mixing operation forms a dry agglomerate. Applicants note that simply because dry particles are mixed together does not mean that an "agglomerate" is formed. For example, if dry particles are put in a vessel and gently stirred, it would be expected that what would be obtained would be a mixture of particles that are separate from each other so that each of the particles retained their pre-mixed size, shape, etc. To form an agglomerate requires something further. Examples of possible methods to produce agglomerates are provided in paragraph [0030] of the present application. There is no evidence that Takuya contemplated using any of these methods or any other method to form an agglomerate, as there is no indication in the above excerpts that an agglomerate is formed. Accordingly, Takuya does not disclose, teach, or suggest forming a dry agglomerate and then adding a solvent to it to form a paste.

Sauer teaches a method of forming agglomerates of dry particles (see column 2, lines 30+: “At this high speed, the cutting edges impinge upon the mixture particles with such intensity that especially the PTFE agglomerates which are still present are fractured into very fine particles. In so doing, there even takes place a partial vaporization of PTFE, which then precipitates elsewhere upon the carbon particles. After about 8 to 10 hours of treatment . . . no PTFE particles remain observable.”). Sauer then discusses rolling the dry mixture using a rolling system. Sauer does not, however, disclose, teach, or even suggest adding a solvent to this dry mixture, and in fact teaches away from doing so when it discusses the shortfalls of using “wet” processes to form components of gas diffusion electrodes (see column 1, lines 15+).

In the Advisory Action, the Examiner appears to suggest that it would have been obvious to take the agglomerates formed in Sauer and to use them to replace the “dry powder” of Takuya (Applicant notes that it is unclear whether the Examiner is referring to only the “carbon” of Takuya or both the “carbon” and PTFE together). There is no disclosure, teaching, or suggestion in either of the references to make this modification to Takuya’s process, and the Examiner has not properly established why one of skill in the art would have been motivated to do so. One of the references was directed to a dry process, while the other was directed to a wet process. The Examiner has simply assumed that the agglomerates of Sauer could be used in the process of Takuya, without any evidence that this would be the case. Applicant notes, for example, that in paragraph [0017] of Takuya, the graphite, PTFE, and solvent are all mixed together at the same time to form a paste – in sharp contrast, in the presently claimed process, agglomerates containing PTFE and carbon are created first (to get the PTFE to coat the carbon and catalyst) and only after the agglomerates are formed is the solvent added – neither Takuya nor Sauer recognize the need to perform the steps in this manner, and the Examiner has provided no rationale as to why one would have been motivated to modify the process of Takuya in this manner or what advantage would have been expected (since neither Takuya nor Sauer even hint that they recognize any advantage of doing so). Applicants note that if the process of Takuya was modified in the manner suggested by the Examiner, a different end product would be obtained - in Takuya, the PTFE and the carbon are mixed with the solvent together – thus, the

PTFE would not coat the carbon in the same manner it would if the carbon and PTFE were agglomerated prior to mixing with the solvent. There is no rationale provided as to why one of skill in the art would have found it beneficial to make this change.

Only the Applicant of the present application recognized that significant advantages could be obtained by combining the use of agglomerates as described in the present application with a wet process. Indeed, the present disclosure talks at length about this.

It would not have been obvious to combine the teachings of Sauer with those of Takuya, since such references disclose entirely separate processes that were not heretofore as being compatible. Sauer teaches a dry method that does not use a solvent and discusses the shortfalls of using a wet method; Takuya teaches a wet method and does not discuss using such wet method in conjunction with an agglomerated dry mixture. As noted in paragraph [0037] of the present application, the inventor has developed a method in which “the best qualities of the dry and the wet production method are utilized to form a method for cost effective continuous production of gas diffusion electrodes.” Neither Sauer nor Takuya recognized the benefits that may be obtained from combining these methods. Only the inventor of the present application did so. Of course, any reliance on the present disclosure as a roadmap to combine the teachings of the unrelated Sauer and Takuya references would constitute impermissible hindsight reconstruction, and could not properly form the basis for an obviousness rejection under 35 U.S.C. § 103(a).

The remaining cited references (Plowman et al., Takeuchi et al., Santilli et al., Gascoyne et al., Kato, and Soloman) do not cure the deficiencies of Takuya and Sauer, since none of such references, whether taken alone or in combination with Takuya and Sauer, disclose, teach, or suggest forming both an active layer and a gas diffusion layer in separate processes that each involve agglomerating a powder mixture with PTFE particles in a dry form to produce a dry agglomerate, adding an organic solvent to the dry agglomerate to produce a paste, and calendaring the paste.

Because the combinations of elements recited in independent Claims 26, 45, and 61 are not disclosed, taught, or suggested by any of the cited references, whether taken alone or in combination, such claims (as well as their associated dependent claims) are believed to be patentable. Reconsideration and withdrawal of the rejections and allowance of all pending Claims 26-69 is therefore respectfully requested.

* * *

It is submitted that each outstanding objection and rejection to the Application has been overcome, and that the Application is in a condition for allowance. Applicants request consideration and allowance of all pending claims.

It should also be noted that although arguments have been presented with respect to certain claims herein, the recited subject matter as well as various other subject matter and/or combinations of subject matter may be patentable for other reasons. Further, the failure to address any statement by the Examiner herein should not be interpreted as acquiescence or agreement with such statement. Applicants expressly reserve the right to set forth additional and/or alternative reasons for patentability and/or allowance with the present Application or in any other future proceeding, and to rebut any statement presented by the Examiner in this or other papers during prosecution of the present Application.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of

papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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